i-MapNJ

Environmental Interactive Mapping Application

Tutorial for New Users

October 16, 2002

Introduction

For a number of years NJDEP has been developing spatial data layers for use in its Geographic Information System (GIS). GIS is a technology that integrates software tools with spatial data, enabling the relationships of mapped features to be analyzed. These spatial data layers contain mapped features of some environmental concern. For NJDEP, analysis of the spatial data in GIS leads to better environmental decision-making.

NJDEP has also recently been building a department-wide environmental database called the New Jersey Environmental Management System (NJEMS). NJEMS is the department's database used for tracking agency activities, permitting and enforcement data.

i-MapNJ is NJDEP's first interactive mapping application, and is designed to serve the department's NJEMS and GIS data over the web using ESRI's ArcIMS (Internet Map Server) Internet mapping technology. The application provides a map view frame, a popup window for tabular information related to map features, a toolbar for basic GIS analysis, several predefined queries, and the capability to produce a basic map layout that can be sent to the user's printer. Desktop GIS software does not need to be installed on the user's PC to run the application, all that is needed is a web browser. The application will run best using a later version of Microsoft Internet Explorer, but will still work on machines running earlier versions as long as the version is above 4.0. It does run on Netscape browsers, but not as reliably.

Using i-MapNJ, users can perform basic NJEMS site queries, view and analyze the results along with selected GIS mapped data layers on a map, and print the map. An NJEMS site is an entity that is regulated by, or of some interest to, one or more programs within NJDEP. The application can search for individual locations (NJEMS sites, address locations, state plane coordinates) or multiple NJEMS sites based on some user entered selection criteria. The NJEMS sites selection criteria allow selections based on NJDEP agency activity, program interest, and discharged parameter. The NJEMS site selections are restricted to an area of interest designated by the user. The areas include sites within a radial range from a currently selected location, or sites within a municipality, county, or watershed management area.

The purpose of this tutorial is to provide an easy to follow guide allowing new users to become familiar with the application's basic capabilities and functionality. Elements of the application to be covered include:

- **Launching i-MapNJ**
- **i-MapNJ User Interface Components**
- **Finding the Location of an Address**
- **Searching for NJEMS Sites Near an Address**
- **Printing a Map**
- **Help Information**

The tutorial is divided into sections where particular topics are explained, which are followed by exercise demonstrating the functionality. Included also are screen shots to provide additional clarity.

For users that wish to explore i-MapNJ's capabilities further, look for the ***i-MapNJ Tutorial for Advanced Users***. The advanced tutorial provides users with many different examples of NJEMS site searches and GIS maptools functionality.

Chapter 1
Launching i-MapNJ and User Interface Components

1.1 Launching the Application

The application can be accessed from the i-MapNJ application's splash page at:

www.nj.gov/dep/gis/imapnj/imapnj.htm

The i-MapNJ splash page provides a basic introduction to i-MapNJ, and useful links related to the application. Included is a tutorials link, which takes the user to the i-MapNJ tutorials page. The tutorial documents, which can be saved or printed provide guidance for new users, advanced users, and users that want to use i-MapNJ for specific interests.

To launch the application, click on the *Launch i-MapNJ* (blue) button, or on the Click Here to Launch i-MapNJ map graphic.

After launching the application from the NJDEP GIS web site, the user should see the i-MapNJ user interface.

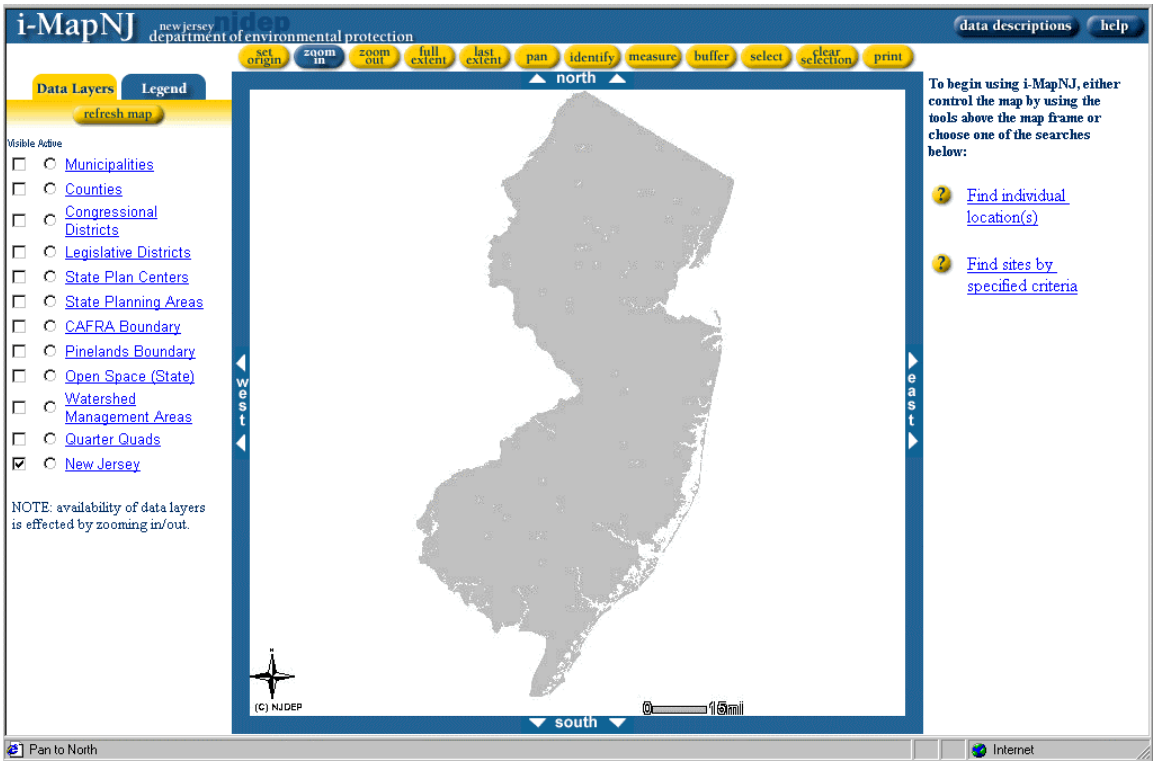


Figure 1-1. i-MapNJ user interface

The user interface consists of the map view frame in the center, the data layers list to the left of the map view frame, the map tools buttons above the map view frame, and the queries or searches the application can perform to the right of the map view frame. In the map view frame, a map of the state of New Jersey is displayed. The region of the screen where the data layers list resides also is used for the map's legend. Users can switch between the data layers list and the legend by mouse clicking on either the Data Layers or Legend tabs, found at the top of the layers list.

Exercise 1.1 - Launching i-MapNJ

1. *The user must first launch their web browser. i-MapNJ runs more reliably in Microsoft's Internet Explorer.*

2. *Navigate to the i-MapNJ splash page at: www.nj.gov/dep/gis/imapnj/imapnj.htm* **.**

3. *The i-MapNJ splash page appears. To launch the application, click on the i-MapNJ graphic in the middle of the page, or on the blue Launch i-MapNJ button near the right margin of the page.*

The application sets its map view to the extent of the state of New Jersey.

1.2 User Interface Components

1.2.1 Map View Frame

The map viewer frame contains the map view that will render the map graphics that include GIS data layers, scale bar, and north arrow. The application's map view frame enables users to display GIS data layers and the results of site searches executed by the user.

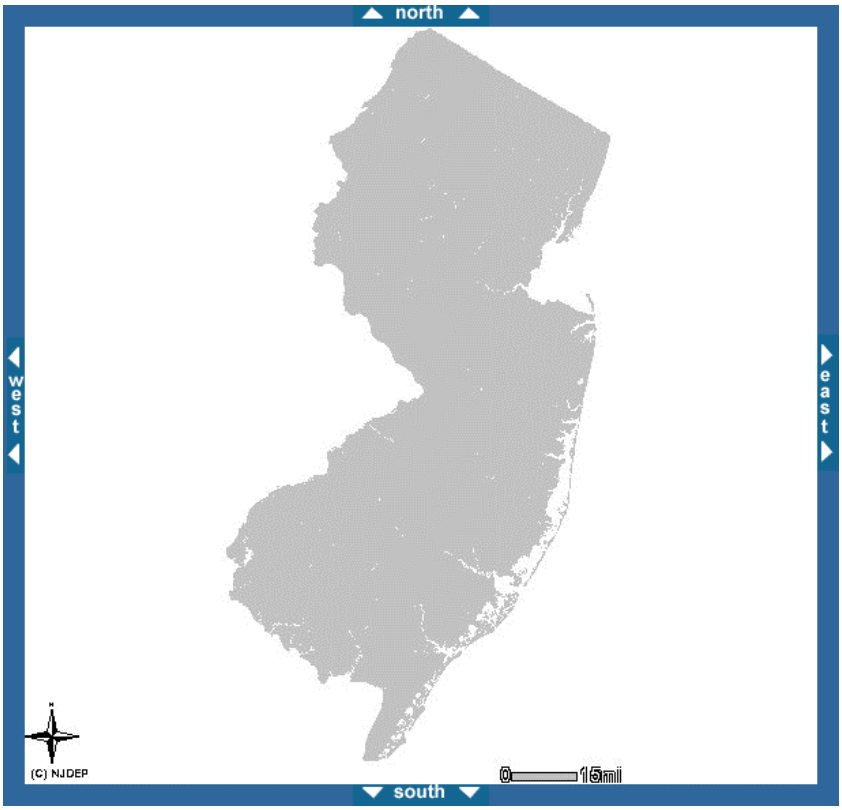


Figure 1-2. Map view frame.

1.2.2 Tabular Data Window

The tabular data window displays data records from the active GIS data layer. This window is not visible to the user initially. It appears when the result from NJEMS sites searches are presented to the user, or when a user has employed the *select* tool to select features from the active GIS data layer. These records will correspond to highlighted (in yellow) features displayed in the map view frame. The tabular data window also appears when the user employs the *identify* tool to determine the identity of a feature belonging to the active layer.

Sites

Rec	NJEMS Site ID (e.g. 00012345)	Site Name	Address Line 1	City	State	Zip Code	County	Municipality	X	Y	Coordinate System
1	2525	GENERAL HOSPITAL CENTER @ PASSAIC	350 BOULEVARD	PASSAIC	NJ	07055	PASSAIC	PASSAIC CITY	592436	737983	NEW JERSEY STATE PLANE 83 - USFEET

Figure 1-3. Tabular Data Window

The tabular data retrieved from the NJEMS Sites GIS layer will include Rec (record number), Site ID, Site Name, Street Address Line 1, City, State, Zip Code, County, Municipality, X-Coordinate (Easting), Y-Coordinate (Northing) and Coordinate System. Tabular data related to features from other GIS data layers will be specific for each GIS layer.

1.2.3 Data Layers

Additional GIS data layers can be made be visible after their respective checkboxes are checked in the data layers list, and the user clicks on the **refresh map** button. Data descriptions for a layer may be accessed by clicking on the data layer's name (underlined) which links to a data description page.

Certain GIS data layers in the i-MapNJ application have scale dependencies meaning they will be available for display at large scales (zoomed in) but not available at small scales (zoomed out). This means that the data layers listed will vary based on the current map scale, or area of extent displayed by the map view frame. As a user zooms in to a smaller and smaller area, more GIS data layers become available for display. The user may have to scroll down the list to see all of the layers that are available. The following map view frame is zoomed in on a site at a scale approximately 1:12,000. At this scale, the Aerial Photos 1995/97 layer is available for display as a background. This imagery cannot be displayed when zoomed out to a smaller scale, such as 1:50,000.

Figure 1-4. Several layers, such as the Aerial Photos 1995/97 layer, are only available at larger map scales (i.e., when zoomed to a smaller area).

While many GIS layers can be displayed at one time, the user can only designate one GIS layer as the *active* layer. The active layer can be set by a user by clicking on the layer's corresponding radio button. Many of the GIS toolbar tools act only on the active layer. For instance, if the user wants to use the *identify* tool to find out some information on a segment belonging to the streams data layer, they must first set the streams layer as the active layer before they use the identify tool. The entire list of GIS layers available in the application includes:

Aerial Photos 1995/97	Landscape Project (Forest)	Sites (NJEMS)
CAFRA Boundary	Landscape Project (Grassland)	Soils (ITU)
Congressional Districts	Landscape Project (Wetland Forest)	Soils (SSURGO)
Counties	Legislative Districts	State Plan Centers
Groundwater Contamination Areas (CEA)	Municipalities	State Planning Areas
Groundwater Contamination Areas (CKE)	Named Places	Streams
Impervious Surface % (1995)	NJ State Boundary	Water Bodies
Known Contaminated Sites (2001)	Open Space (State)	Watershed Management Areas
Land Use (1986)	Pinelands Management Area	Watersheds by Name(HUC11)
Land Use (1995)	Public Community Supply Wells	Sub-Watersheds (HUC14)
Land Use Change (1986-1995)	Quarter Quads	Wellhead Protection Areas
Landscape Project (Beach)	Roads (source NJDOT)	Well Program Grid
Landscape Project (Emergent Wetlands)	Roads (source TIGER)	Zip Codes

1.2.4 Legend

The map view frame's legend is not initially visible to the user. It actually swaps the same physical space on the screen with the data layers list. To view the legend, the user must click on the legend tab. The legend will display the symbols and shade patterns used by the application for each visible data layer.

1.2.5 Map Tools Toolbar

The Map Toolbar, above the map view frame allows users to perform some basic but useful GIS analysis. The following table summarizes the function of each tool:

i-MapNJ Map Tools Functions

Button	Toolbar Name	Toolbar Description
	Set Point of Origin	Captures X-Y coordinate of a location when a user mouse clicks on the map. The captured point can be used as a point of origin for a radial search.
	Zoom In	Zooms in on the position clicked on or the box dragged on the map.
	Zoom Out	Zooms out on the position clicked on or the box dragged on the map.

full extent	Zoom to Full Extent	Zooms to the full extent of the map.
last extent	Previous Extent	Zooms to the last previous extent. Inactive until user changes extents.
pan	Pan	Pans the map as the user drags the pointer across the map.
identify	Identify	Allows the user to click a feature from the active data layer, and view the descriptive tabular data associated with the feature.
measure	Measure	Allows a user to measure distances on the rendered map.
buffer	Buffer	Allows the user to generate buffers around selected features from the active data layer.
select	Select by Rectangle	Allows the user to click and drag a rectangle to select a group of features from the active data layer.
clear selection	Clear Selection	Clear the selected group of features from the active data layer.
print	Print Map	Enables the user to produce a basic map layout in an HTML page that can be sent to a printer
data descriptions	Data Descriptions - Metadata	Allows a user to access short abstracts on the data layers, and full metadata (how the layers were produced) if desired.
help	User Help	Enables access to user help topics.

Exercise 1.2 - Introduction to i-MapNJ's Basic Functionality

1. ***Turning on Data Layers***. *The Data Layers list appears to the left of the map view frame. It lists the currently available GIS layers for display. A GIS data layer may be made visible by clicking in the checkbox next to the layer's name, then clicking on the* refresh map *button. Many layers can be made visible at the same time.*

   Turn on several layers, then click the ***refresh map*** *button at the top of the data layers list.*

   There can be problems if too many layers are visible. First, the map becomes harder to understand. Second, the more layers that are visible the longer the map will take to draw.

   Only a single layer can be designated as the active layer. By making a layer the active layer, the user then can perform certain actions using some of the map tools (identify, buffer, select) on that layer.

2. **Viewing the Legend**. The Legend and the Data Layers list occupy the same screen space in the application, to the left of the map view frame. Users can toggle between them by clicking on the *Legend* or *Data Layers* tab. The

legend displays map symbols and shade patterns for any GIS data layers currently visible in the map view frame.

*With several layers visible in the map view frame, click on the **Legend** tab to see the symbols that correspond to each layer.*

3. **Map Tools**. The map tools provide some basic GIS functionality to the application.

   Click on the 

   tool button. The user can use the tool in two ways. A single mouse click on the map view frame will zoom the map an incremental amount, centered on the point entered. The user can alternatively define a box using the mouse (click and drag), the limits defining the extent of the zoomed view.
   Zoom in on an area repeatedly, until you see the aerial photography.

   Notice as you are zooming in that more data layers are being added in the data layers list.

   Click on the 

   tool button. The Print Map window opens. The user may enter a custom title for the map, and the frame provides a Create Print Page button that when clicked on will produce a print page of the map graphics (including title and legend) which can be sent to the user's printer. See Chapter 4 for more details.

   Click on the 

   button. The i-MapNJ Help Topics window opens, providing a list of topics the user may view. By selecting among the help topics the user can find information on procedures to perform specific activities and view frequently asked questions.

CHAPTER 2

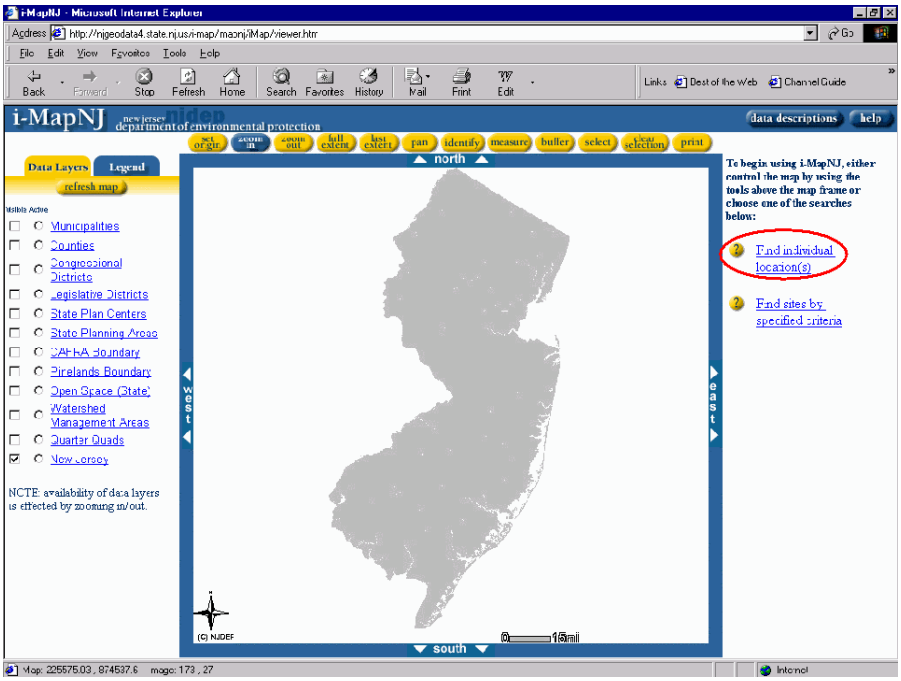
Finding the Location of an Address

The two pre-defined searches in the i-MapNJ application include the *Find individual location* search and the *Find sites by specified criteria* search. These searches are launched by clicking the corresponding buttons or links found to the right of the map view frame. The discussion in this chapter will be on locating an address by way of using the *Find an individual location* search. This search is designed to retrieve or locate a single address that may be where someone lives or has a particular interest. The following exercise will help demonstrate how to perform this search.

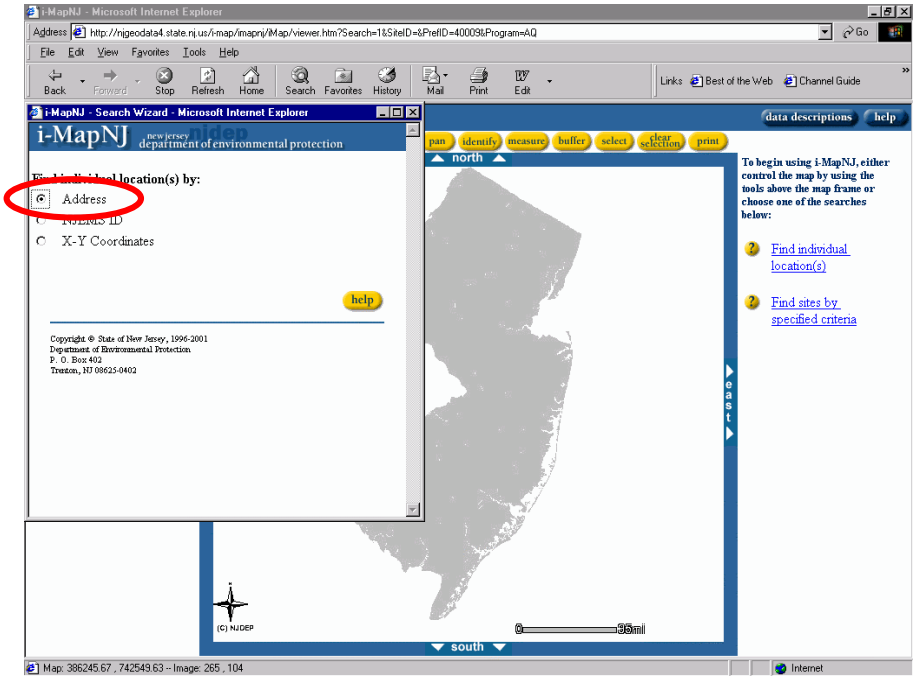
Exercise 2 - Address Search

A user may be very interested in locating where they live (if they live in New Jersey) or may have some interest in a property for which they know the address. Using i-MapNJ, the user can find this location, and by turning on additional GIS data layers begin to see what features of environmental interest are in close proximity. A user might be interested in nearby sites NJDEP has regulated and under what program. Another user might be interested in seeing how close they live to wetlands. Still another might be interested in seeing if they reside anywhere near areas of known groundwater contamination. The following exercise demonstrates how to locate some of the facilities in proximity to an address entered by the user.

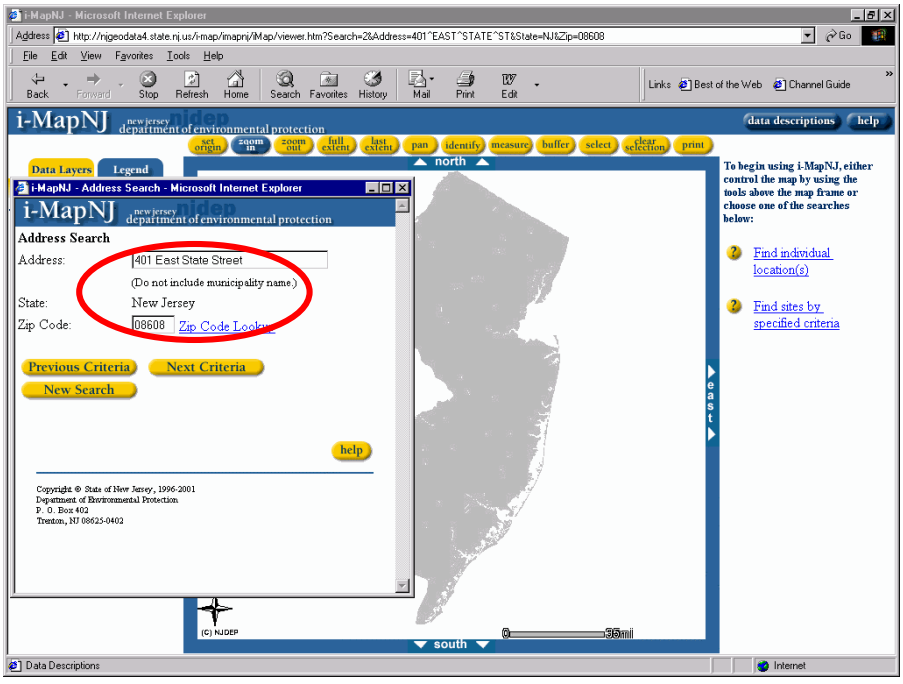
1. *Click on the Find an individual location search button.*



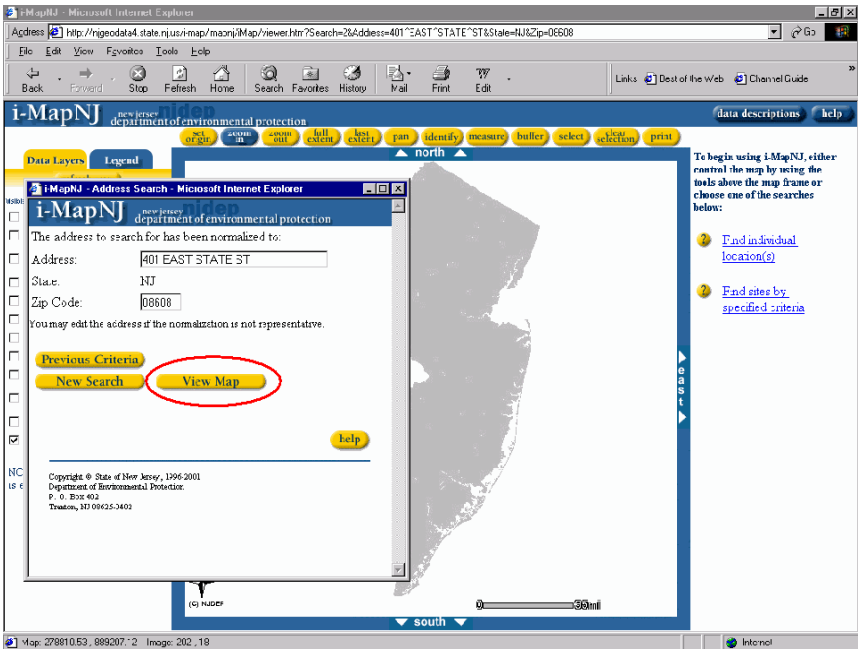
2. *Select the **Address** choice from the search wizard window.* The application provides a window with address fields in which the user may enter an address.



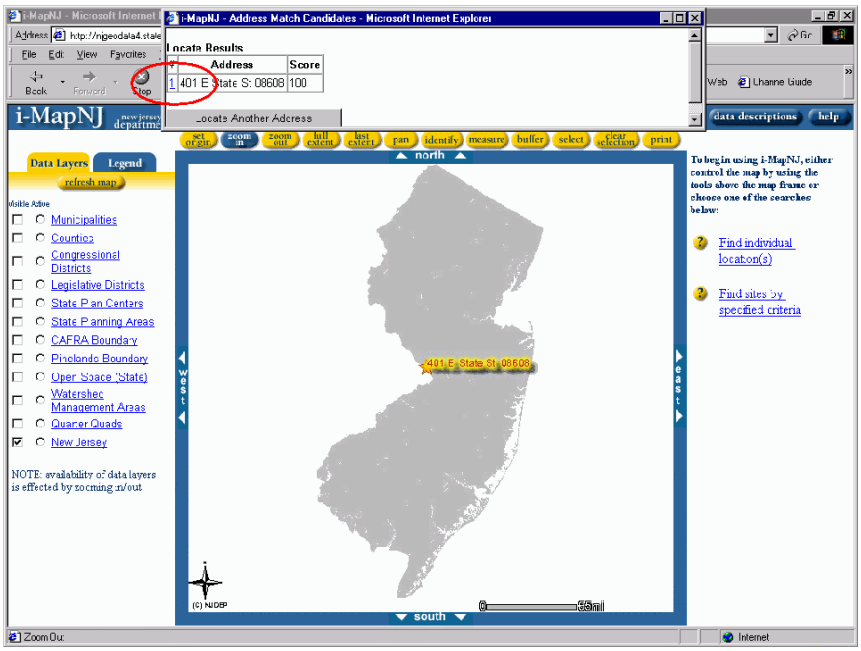
3. *Enter your address. Only the house number, street, and zip code are required.*



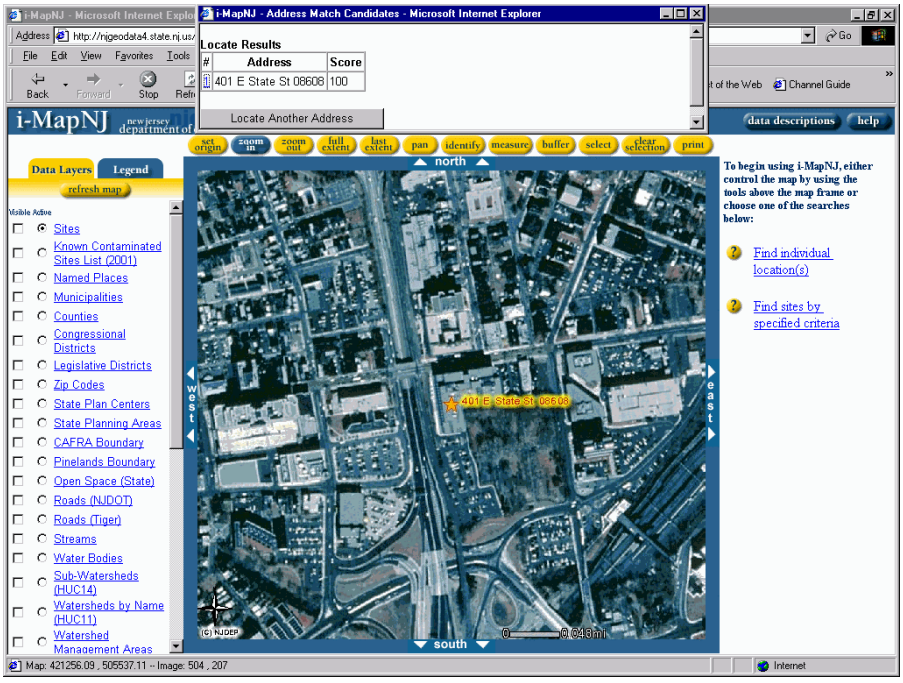
4. *After clicking on the **Next Criteria** button, the application will normalize the address (i.e. uppercase the address and replace certain address elements with standard U.S. postal abbreviations). After this normalization takes place, click on the **View Map** button to execute the search.*



The i-MapNJ application attempts to locate the address. Zip codes, street names and address number ranges are coded to the road segments that make up the TIGER roads GIS layer and are used as the basis to estimate the location of the entered address. The *Address Match Candidates* window will appear and indicate to the user whether there was a successful match.



5. If a single match was found, a single listing will appear in the *Address Match Candidates* window, and an orange star will mark the location on the map view frame. Click on the blue # 1 hyperlink (first column) in the table in the *Address Match Candidates* window to zoom the map view frame to the location.



Sometimes the application will list several address matching possibilities (ranked by score) in the *Address Match Candidates* window and will leave it up to the

user to select one of these by clicking on one of the blue underlined hyperlinks. The application will then zoom the map view frame to the address location, with the location symbolized with an orange star.

Not all addresses will match successfully. This is usually due to missing roads or inaccurate coding of address information in the TIGER roads layer. Addresses belonging to homes in newer housing developments (<10 years old) will not likely match. A user may in this situation try several nearby addresses of older homes to get a match that would be in the neighborhood.

Keep in mind that the address matches are estimated locations, based on an assumed even distribution of addresses along a road segment in the TIGER roads layer. Users may see that the marked location can differ greatly from the true location depicted on the aerial photo image.

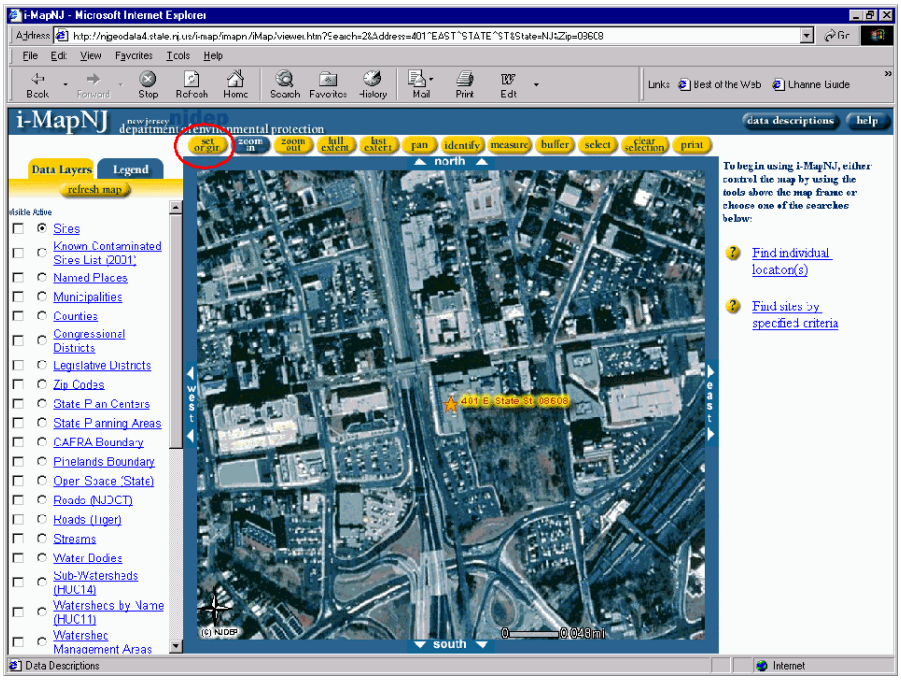
If the address entered happens to correspond to the address of a regulated site in NJDEP's NJEMS database, i-MapNJ immediately zooms the map view frame to the site's location, and information related to the site appears in the tabular data window.

CHAPTER 3

Searching for NJEMS Sites Near an Address

3.1 Using the Address as a Point of Origin for NJEMS Site Searches

Once the address has been located, it can be used as point around which a radial search of sites within the NJEMS database can be conducted. A radial search will search for sites that are within a user specified distance from the address location that is serving as the origin point. In this way, property owners can find out which types of regulated sites exist around their property, and have these locations graphically displayed over an air photo.



Note: Any point on the map can be established as a point of origin for a radial search using the ***Set Origin***  tool from the Map Tools toolbar. The user can simply mouse click on any location on the map. This tool is handy if for some reason the application does not find the user's address. They may be able to zoom to their neighborhood and with the Aerial Photos 1995/97 and perhaps other GIS layers turned on, locate their home visually. The user could then establish the location with the tool. With an origin point established by the user, the application can determine which NJEMS sites meeting specific selection criteria fall within the circular buffer area defined.

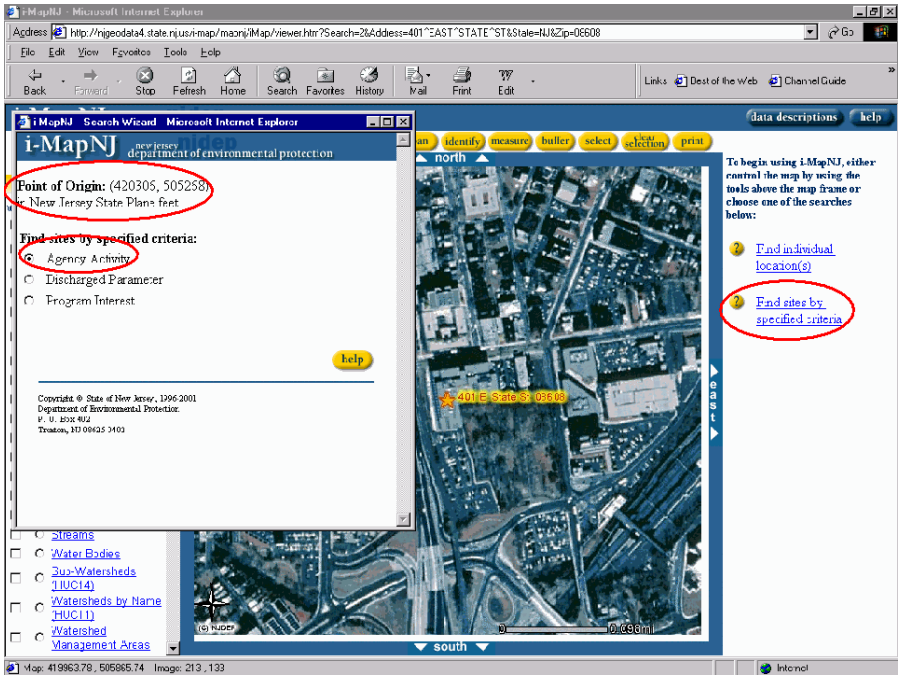
The i-MapNJ application provides three NJEMS multiple site search types, which are presented to the user after clicking on the *Find sites by specific criteria* link to the right of the map view frame. A radial search can be run using any of the three.

Find Sites By Specific Criteria - Search Types

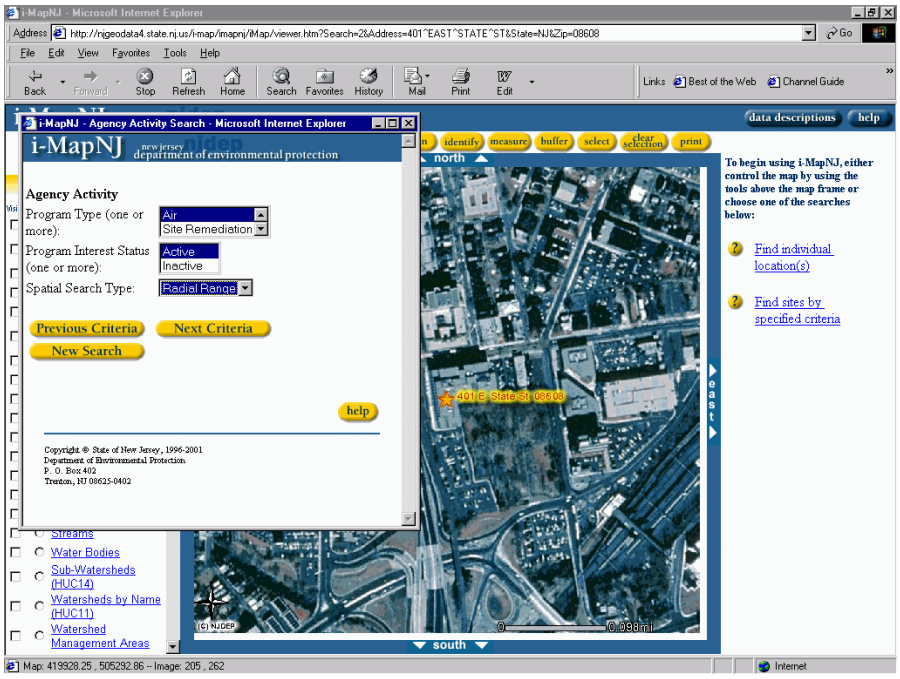
Agency Activity	Finds sites that are associated with NJDEP permitting activities.
Discharged Parameter	Finds sites that are regulated for the emission or discharge of particular parameters or compounds.
Program Interest	Finds sites that are regulated by or otherwise of interest to a particular NJDEP program.

Exercise 3 - Radial Search

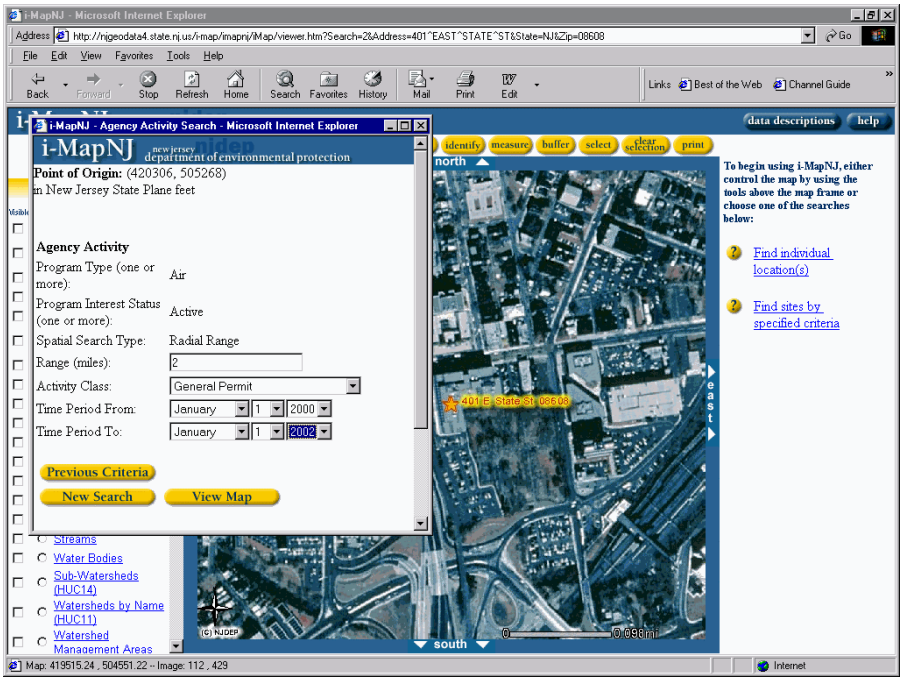
1. *Select the* ***Find sites by specified criteria*** *button.* The pop-up screen shows the X and Y coordinates of the point of origin (in NJSPF, NAD83), as well as three types of NJEMS multiple site searches. For this exercise, select ***Agency Activity***.



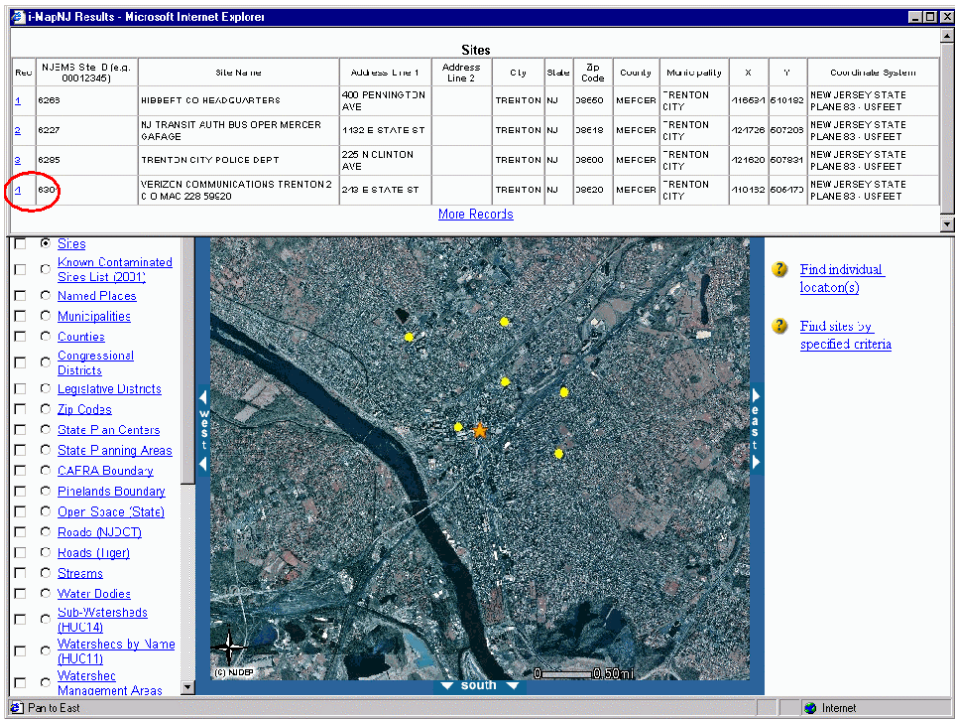
2. The user can now choose a specific Program type, whether the sites are active or inactive, and whether the search should be by a county, municipality, watershed management area, or radial range.



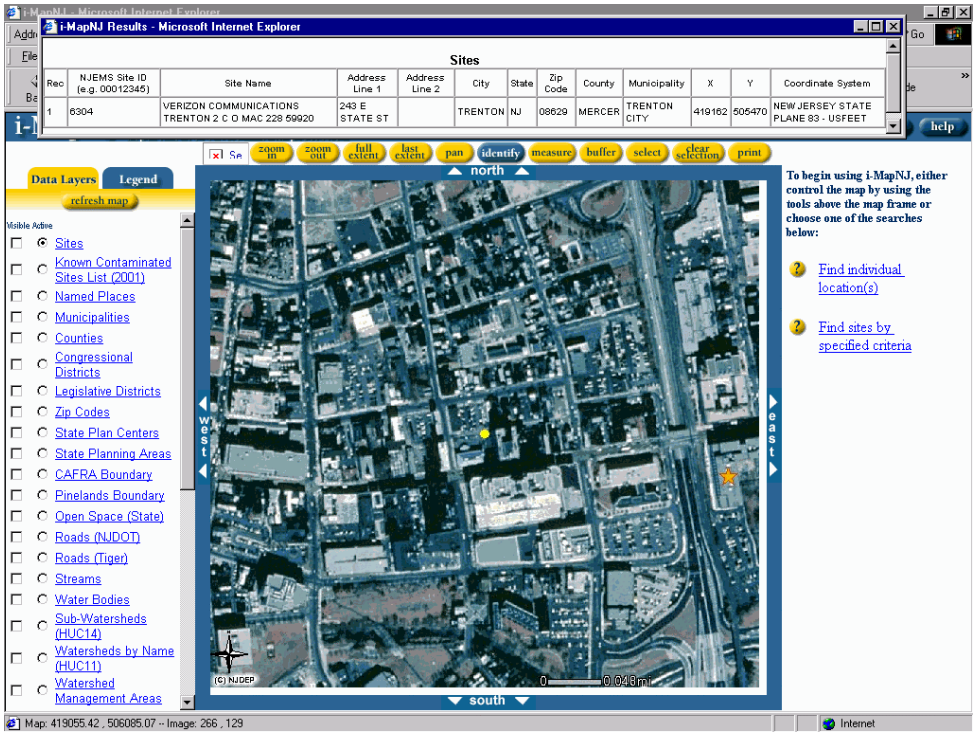
*Select **Air** Program, **Active** Status, and **Radial Range** spatial search type, then click on the **Next Criteria** button.*



4. *Enter a Range (distance in miles), select **General Permit** for the Activity Class and enter a Time Period range for which to conduct the search. Click on View Map to display the sites selected for these criteria.*



5. *Each of the sites meeting the criteria is displayed with a yellow marker. A table of the sites found is also displayed. To zoom in to the location of any one site, click on any blue number on the left of the table. The application will zoom to that specific site.*



Users can now add GIS data layers to the view by turning on any of the layers in the layer list, and refreshing the map. Similar searches selecting different Agencies Activity Types, Discharge Parameters, Program Interests, or time periods would be executed in the same fashion using the same or a new origin point.

Chapter 4
Printing a Map

Any map displayed in the i-MapNJ map view can be sent to a user's printer. Users should consider whether adding (or removing) GIS data layers would improve the map's clarity before printing. If the map's scale is too small and the Aerial Photos 1995/97 data is not available for display, consider adding roads and hydrography (Streams and Water Bodies) to provide reference data. There are also considerations if you are sending the map to a color or black and white printer. Map data layers with different colored symbols will stand out when the map is printed using a color printer, but may not be easily distinguished when printed in black and white.

Exercise 4 - Print Map

1. *If desired, add data layers, making **Roads** (NJDOT or Tiger**)** and/or **Streams** and **Water Bodies** visible by clicking on the checkboxes next to their names in the Data Layers list.*

   Different layers may be used if more appropriate. Note that if the map viewer is displaying too large an area (small scale), the Roads, Streams and Water Bodies layers will not appear in the Data Layers list. If possible, the user may want to zoom to a larger scale.

2. *Click on the **refresh map** button at the top of the data layers list. The map will redraw with the added layers.*

When the user is satisfied with the map's appearance they can follow these print steps.

3. *Click on the* 

button on the toolbar. A print map window opens.

4. *Replace the default 'New Jersey Map' title with something that indicates what the map is about. The title could include wording describing the search used to produce the map result, if appropriate. Then click on the **Create Print Page** button.*

5. *The print page is produced in a separate browser window, and it includes the map, the map legend, map scale bar, and map title and north arrow. To print this page, simply click on the web browser window's printer icon, or click on File - > Print from the browser's main menu bar.*

Chapter 5
Help Information

To access help information and Frequently Asked Questions (FAQs) click on the **Help** 

button from the main toolbar. This will open a separate browser window with links to help files and FAQs. Here are the FAQs as of 10/16/02.

Frequently Asked Questions

FREQUENTLY ASKED QUESTIONS	ANSWERS
What versions of web browsers work with i-MapNJ?	You are best off using later versions of Microsoft's Internet Explorer or Netscape's Communicator. Minimum versions are 4.0 and above. i-MapNJ performs more reliably in Internet Explorer and it is recommended that user view the application using this browser.
What happened to my aerial photo?	The aerial photographs (Aerial Photos 1995/97 layer) are scale dependent and do not appear until the scale is 1:30,000 or larger (i.e., 1:25,000).
Why does the application not always provide the same data layers in the data layers list?	The map data layers made available to the user are scale dependent. This means that as a user continues to zoom in closer on an area of interest, more map data layers are made available by the application. Roughly on third of the layers can be displayed when the application loads at start-up. Additional layers can be displayed when the scale is greater than 1:500,000, several more when greater than 1:200,000. The air photos and the well grid can be displayed when the scale is greater than 1:30,000.
Why can't I find the address I am interested in?	Achieving success when address matching an entered address is dependent on a few factors. If your address is in a more recently developed area, the roads layer that contains the address range information may not be current enough, preventing a successful match. There can also be address range coding errors in the roads layer. If this is the case try a different address, close by, that can get you at least close to your location of interest.
Why do some searches retrieve faster then others?	Searches that are retrieving more data take longer than searches that are retrieving less data. For example, searching for all sites that have an Air program interest in a county will take longer than it would to search for all sites that have an Air program interest within a municipality.
Why does the i-MapNJ application perform differently throughout the day?	The i- MapNJ application is a web application whose performance is subject to a number of factors including the user's connection to the Internet, and the amount of data that is being requested from the application's servers, and how many concurrent requests to those servers are being made by all of the users at a given time.

Why does my search retrieve five results but when I click on a point it returns six results?	After completing a search, the i-MapNJ Map View displays the resultant selected set. Nevertheless, other sites that did not match your criteria are still present (just not visible). So when you use the identify tool on a selected site, there may be other sites in close proximity that are being identified as well.
What is the difference between the radial range search option under *Find sites by specified criteria* and the function performed by the map tools buffer tool?	Though they seem to be similar functions there are major differences. The map tools buffer tool can be used to create buffer zones around features from any of the application's GIS data layers. You can also opt to highlight features from another data layer that are at least partially within the boundaries of the buffer areas that will be created. Please note that if you are zoomed to a small area and use the buffer tool, you might not see the entire extent of the buffer area - the application will not zoom out to show the entire extent. You will have to use the zoom out tool. The Find sites by specified criteria radial range option only works on the NJEMS sites layer, and generates a single circular search zone around an established origin point. This search zone, which one could think of as a buffer around an origin point, is not displayed on the map. Only the subset of NJEMS sites determined by the search to be within the search zone is displayed. The map view frame zooms to the extent of the search zone, allowing the user to see the subset of sites.
Can I change the symbols of layers or the order in which the overlay?	No. Unlike GIS desktop applications like ArcView, and ArcExplorer, you can not alter the colors and symbols nor alter the layer drawing order that are presently set in i-MapNJ.
Can I export the tabular data?	There are no easy exporting capabilities at this time. One can highlight, copy and paste in Excel, but this can be difficult. Especially when the tabular data consists of many records.
Can I print the tabular data?	Yes. The i-MapNJ Viewer is made of HTML frames. If you wish to print the tabular data results click your mouse on the table to activate the text frame. Then using the browser's print capabilities under the File menu select Print and make sure in the Printer confirmation window that the "Print Selected Frame" is selected.
Can I add a GIS data layer that I have stored locally on my computer to the i-MapNJ application?	No.
What happened to my tabular data?	The tabular data displays records for a selected result set. The results from a search is a selected set. The sites found using the select (by rectangle) tool is a selected results set. Identifying a point is a selected set. Each time you switch tools and select new data you lose your old selected set.
Why did my map retrieval fail?	Once you execute a search and map retrieval you must let it complete or you will disrupt the transfer of the map. For this reason, it is recommended that users not click on the map or initiate other viewer actions while the transfer is still running.
Why are some NJEMS sites not located where they should appear?	There are some site coordinate data errors within the over 100,000 site records in NJDEP's NJEMS database. The majority of the site locations have been determined through the use of global positioning system (GPS) technology, which is very accurate. Additional locations have been loaded into the NJEMS database from existing NJDEP program databases. Others have been

	determined through an address matching process.
Why does the TIGER roads data not match very well with the Aerial Photos 1995/97 layer?	The reason is that the TIGER roads data was compiled at a much smaller scale (1:100,000) compared to the air photo image data. You might notice that the TIGER roads data often lacks detail in areas, and this is again due mainly to the scale at which the data was compiled. The TIGER roads data does provide a benefit in that the arcs that make up the layer are coded with street names and address ranges, allowing users to derive coarse locations using address matching methods. The DOT roads layer was compiled at 1:24,000 scale and later updated to match the air photos. Unfortunately, there are no street names or address ranges associated with this layer that would allow more accurate address matching.
Can I do a multi-site search with more than one GIS polygon?	You can not do this type of search through the Find sites by specified criteria search screens but you can do more complex spatial joins across polygons using the buffer tool.
What coordinate system is the information mapped in?	The mapped data in the application is in the New Jersey State Plane Coordinate System (NJSPCS), in units of US Survey Feet, referenced to the North American Datum of 1983 (NAD 83) horizontal geodetic datum.
Can I do multi-media searching?	Yes, you may select more than one program interest at a time by using your keyboard's CTRL key and selecting as many program interests as you wish..
Where do I get information on the mapped data used in i-MapNJ?	This information is available by clicking on the blue *data descriptions* button above the i-MapNJ map tools toolbar. This opens a window that lists all map layers. A brief description of the data is provided when a user clicks on the name of a layer in the data layers list. If a user wants to see further information, they may click on the full metadata button to view FGDC compliant metadata.